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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/753,722	01/04/2001	Shingo Iwasaki	041514-5103	2640

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EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/753,722

Applicant(s)

Iwasaki et al.

Examiner

B. William Baumeister

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Jul 23, 2003
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above, claim(s) 6, 8, 15-29, 35, 37, and 44-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 9-14, 30-34, 36, 38-43, and 47-51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

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## **DETAILED ACTION**

### ***Claim Rejections - 35 U.S.C. § 103***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-5, 7, 9-14, 30-34, 36, 38-43, 48 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneko et al. '605 in view of EP '533.

a. Kaneko teaches MIM electron emitting devices having an electron source 1; an insulating layer 2 having a recess or island; and a metal thin film such as Au 3 formed thereover. Note particularly, (1) PRIOR ART FIG 2 wherein the SiO<sub>2</sub> insulating layer 54 is recessed inward and Au layer 55 is reduced on the sidewall (claim 9); (2) FIGs 4A/B wherein insulating layer 2 has a thickness of 50-200 angstroms in the recessed region and a thickness of 2000-5000 angstroms in the other regions (claim 11); FIG 5B wherein the metal 3 is terminated on the insulating layer 2 (claim 12); and (4) FIG 8 wherein the SiO<sub>2</sub> insulating layer 11 terminates on the underlying Si electron supply layer 10 (claim 13). Kaneko does not disclose the additional feature of a carbon region on at least one of a top, bottom and inside of the island region, as recited in claims 1 and 30.

b. EP '533 teaches a display apparatus including a pair of spaced substrates with a vacuum therebetween, a plurality of electron-emitting devices provided on the first substrate; a collector electrode provided on an interior surface of the second substrate with a phosphor layer

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and wherein the electron emission devices have an electron supply (source) layer 12; an insulating layer 13; and a thin film metal electrode 15 which may be composed of Au. In the embodiment of FIG 26, an intermediate layer 14 having a work function which is lower than that of said thin-film metal electrode 15 is interposed between the insulating layer 13 and the metal thin film 15. See page 16, lines 20-25 wherein the reference teaches that this layer may be composed of C or ZrC. The Embodiment of FIG 34 also teaches that the low-work function material may be formed dispersed within the metal electrode 15.

c. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the C-compound low work function material in the electron-emitter device of Kaneko--either as an interposed layer or alternatively by being dispersed within the metal thin film--for the purpose of facilitating the transfer of electrons from the insulator to the thin-film metal layer and thereby improving the device's stability and performance as taught by EP '533 (page 17, lines 26 and 58).

d. For clarification, the examiner notes that claim 10 reads at least on FIG 2 of Kaneko when modified so as to include interspersed low work function material as taught by EP 533.

e. Regarding claim 30 and its dependent claims, regardless of whether Kaneko expressly recites or implies the rest of the conventional features (e.g., vacuum, collector, phosphor), these elements are all taught by EP '533 and it would have been obvious to one of

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ordinary skill in the art at the time of the invention to have employed them in conjunction with the Kaneko electron emitter for the purpose of providing a three-color display as taught by EP '533.

f. Regarding claims 48 and 50 which have been presently amended to require that the metal and/or carbon layer is reduced in the island region to a thickness of zero, note that in the Kaneko embodiment of FIG 5A, the subregion A that is within the island region (more clearly depicted in FIG 5B) possesses a metal layer 3' that is gradually reduced to a thickness of zero (col. 8, line 62).

3. Claims 1-5, 7, 11, 14, 30-34, 36, 40, 43 47 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feist '598 in view of EP '533 as applied to claims above.

a. Feist teaches an MIM electron emitter comprising a metal or semiconductor electron source layer 48; an insulating layer formed thereon and composed of BN layer 50 and SiO<sub>x</sub> 54, which, in turn, includes an island region which defines a curved concave recess portion; a metal thin film 56 is formed on the surface of the insulating layer including in the island region; and a low work-function top layer 57 which promotes electron emission into the vacuum. Feist does not disclose that the low work function-material may be composed of a carbon compound.

b. EP '533 teaches a display apparatus including a pair of spaced substrates with a vacuum therebetween, a plurality of electron-emitting devices provided on the first substrate; a collector electrode provided on an interior surface of the second substrate with a phosphor layer and wherein the electron emission devices have an electron supply (source) layer 12; an insulating

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layer 13; and a thin film metal electrode 15 which may be composed of Au. In the embodiment of FIG 26, an intermediate layer 14 having a work function which is lower than that of said thin-film metal electrode 15 is interposed between the insulating layer 13 and the metal thin film 15. See page 16, lines 20-25 wherein the reference teaches that this layer may be composed of C or ZrC. The Embodiment of FIG 34 also teaches that the low-work function material may be formed dispersed within the metal electrode 15.

c. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the C-compound low work function material taught by EP '533 in the electron-emitter device of Feist--either as a superposed layer as taught by Feist for the purpose promoting the electron emission into the vacuum, or alternatively either as an interposed layer or by being dispersed within the metal thin film as taught by EP '533--for the purpose of facilitating the transfer of electrons from the insulator to the thin-film metal layer and thereby improving the device's stability and performance as taught by EP '533 (page 17, lines 26 and 58).

4. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Feist/EP '533 as applied to claims above, and further in view of Kaneko et al. '605 as applied to the claims above.

a. Feist/EP '533 teaches all of the limitations of claim 51, as explained above, except for the further limitation that at least one of the carbon region and metal thin film electrode has a film thickness that is gradually reduced to a thickness of zero in the island region.

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b. As explained above herein, Kaneko teaches in FIGs 5A/B, that metal layer 3' is gradually reduced to a thickness of zero within the island region (col. 8, line 62). It would have been obvious to one of ordinary skill in the art at the time of the invention to have processed that upper metal thin film electrode as taught by Feist/EP '533 so as to further possess portions that gradually taper to zero within the island for the purpose of ensuring low electrical resistance while simultaneously improving electron emission as taught by Kaneko (col. 8, lines 64-68).

### ***Double Patenting***

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-5, 7, 9, 12-14, 30-34, 36, 38-43, 48 and 50 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 of co-pending Application No. 09/754,253 (corresponding to US publication # 2003-0048745 A1) in view of EP '533 as applied to the claims above.

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a. The cited claims are similar in that they both recite most of the same electron emission structures. The '253 application claims are broader than the present claims because they do not further recite the inclusion of the carbon layer. Regarding claims 30-34, 36, 38-43 and 50 of the present application, the '253 application claims also do not recite the presently claimed collector electrode and phosphor layer.

b. As was explained above, EP '533 teaches a display apparatus including a pair of spaced substrates with a vacuum therebetween, a plurality of electron-emitting devices provided on the first substrate; a collector electrode provided on an interior surface of the second substrate with a phosphor layer and wherein the electron emission devices have an electron supply (source) layer 12; an insulating layer 13; and a thin film metal electrode 15 which may be composed of Au. In the embodiment of FIG 26, an intermediate layer 14 having a work function which is lower than that of said thin-film metal electrode 15 is interposed between the insulating layer 13 and the metal thin film 15. See page 16, lines 20-25 wherein the reference teaches that this layer may be composed of C or ZrC. The Embodiment of FIG 34 also teaches that the low-work function material may be formed dispersed within the metal electrode 15.

c. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the C-compound low work function material in the electron-emitter device of the '253 claims--either as an interposed layer or alternatively by being dispersed within the metal thin film--for the purpose of facilitating the transfer of electrons from the insulator to the thin-film metal layer and thereby improving the device's stability and performance as taught by



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EP '533 (page 17, lines 26 and 58). It would have also been obvious to the skilled artisan to have employed the emitter structure claimed in the '253 structure in a display device having a collector electrode with a phosphor layer--as opposed to in a pickup device--as this was a conventional application for electron emitter arrays, as evidenced by EP '533.

This is a provisional obviousness-type double patenting rejection.

### ***Response to Arguments***

7. Applicant's arguments with respect to the claims have been considered but are either moot in view of the new ground(s) of rejection or alternatively are not persuasive.

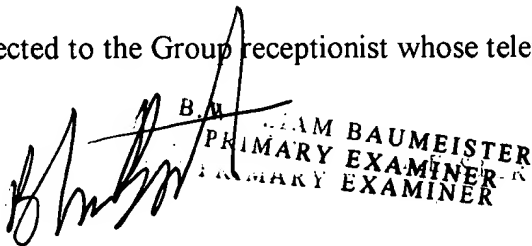
a. Applicant repeats the argument that the Kaneko insulator is not gradually reduce, but rather has corners. This is not persuasive because, as explained previously, the insulator of Kaneko's FIG 5A is as "gradually reduced" as the present applications' FIG 20 embodiment, which also has corners or step variations. The arguments relating to the newly added limitations of claims 47-51 are moot in light of the new grounds of rejection.

b. Also, as all of the elected claims are rejected, the issue of rejoinder of non-elected claims is moot.

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**INFORMATION ON HOW TO CONTACT THE USPTO**

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at **(703) 306-9165**. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read 'B. William Baumeister', is written over a circular official stamp. The stamp contains the text 'B. WILLIAM BAUMEISTER' and 'PRIMARY EXAMINER' in a circular arrangement.

B. William Baumeister

Primary Examiner, Art Unit 2815

September 6, 2003